



Natural Resource Monitoring at Zion National Park



Zion National Park/NPS

The Northern Colorado Plateau Network

The Northern Colorado Plateau Network (NCPN) covers a geologically and biologically diverse region comprising 16 national parks in four western states. These parks contain desert grasslands, shrublands, forests, caves, large rivers, perennial streams, seeps, springs, and striking geology. Invasive plants, trampling and grazing by livestock, and adjacent land-use activities are some of the most significant threats to NCPN parks. The NCPN is designing and implementing a long-term monitoring program to measure key indicators of ecological integrity, or “vital signs.” Multiple monitoring efforts will help inform managers of the health of park resources and provide early detection of potential problems. This brief describes recent NCPN activities at Zion National Park.

Flora Checklist



Sego lily.

Sheri Hagwood@USDA-NRCS PLANTS Database

In 2008, a revised checklist of the vascular flora of Zion NP was completed. This entailed a thorough review of existing literature, re-examination of specimens from the Zion NP herbarium and other state and national museum collections, and additional field work to corroborate unverified species reports and locate new species. Based on this study, 991 vascular plant taxa have been confirmed or reliably reported as occurring in the park.

Another 112 species formerly considered part of the park flora have now been shown to be falsely reported. One plant, Shivwits milkvetch (*Astragalus ampullarioides*), is federally listed as endangered, and at least 184 species are considered species of concern by state and/or federal agencies. Introduced plants make up 14% of the monument flora (140 species), of which 10 are considered noxious weeds by the State of Utah.

Water Quality



Sonde/NPS

At Zion NP, the NCPN cooperates with the State of Utah to collect water quality data used to assess condition and trends relative to the Clean Water Act, human health, and ecological function. Previous monitoring has indicated that the park's most common issues related to water quality were high total phosphorus concentrations in La Verkin Creek and East

Fork Virgin River. The source of phosphorus in these streams is not known, but could be naturally occurring. Continued monitoring of North Creek since the June 2006 Kolob fire and subsequent floods indicates that pH is normalizing. The NCPN plans to install a continuous monitoring station on North Creek in 2009, to more closely track change.

Landbirds



Juniper titmouse.
©Greg Lavaty

Birds play an important role in the flow of energy through ecosystems because they occupy various levels in the food web. Birds are also sensitive to habitat changes, which make them good indicators of habitat quality. The NCPN is partnering with the Rocky Mountain Bird Observatory (RMBO) to assess breeding bird species trends in three habitats: riparian, pinyon-juniper, and sagebrush-shrubland. The NCPN has monitored one plot in pinyon-juniper woodland, and two in

low-elevation riparian areas at Zion NP since 2005. The NCPN and RMBO will produce the first trend estimates for individual bird species after the 2009 field season, the fifth year of NCPN landbird monitoring. The goal is to be able to detect a population change of at least 3% within 30 years. We currently estimate that we will be able to do this for 52 species, representing more than 90% of all individual birds observed during 2005–2007.

Air Quality



Zion NP airshed.
NPS/IM. Large

Understanding changes in air quality can help us to interpret changes in other monitored vital signs. The NCPN will acquire and analyze air quality data from existing stations in NCPN parks. The network's air quality monitoring protocol was undergoing final review in late 2008; its first air quality report will be produced in 2009. For Zion NP, the report will focus on ozone and visibility monitoring.

Ground-level ozone is the major constituent in smog; it can be toxic to humans, and some plant species are particularly sensitive to ozone damage. Visibility-obscuring particulate matter consists of dust, soot, and other fine solid materials that become suspended in the air. Under the Clean Air Act, Class I areas, like Zion NP, are subject to regulatory standards for particulates and visibility.

Riparian Systems



Riparian monitoring/NPS

Integrated riparian monitoring involves the collection of biological and physical measures, such as riparian vegetation, non-native species invasions, streamflow, alluvial groundwater dynamics, and changes in channel form. Developing credible, efficient monitoring approaches will help the NCPN to assess riparian

an-system health and provide early warning of system degradation. Through conversations with park staff, East Fork Virgin River was selected for monitoring at Zion NP. Testing of riparian vegetation methods occurred at Zion NP in the fall of 2008; full implementation is scheduled for 2009.

Climate



Climate station, Zion NP/NPS

The overarching goal of NCPN climate monitoring is to compile and present climate data in a form that helps us to understand the reasons for trends seen in other network vital signs. The NCPN compiles and analyzes climate data from five weather stations in Zion NP. Multiple weather stations are necessary due to the park's large differences in elevation and habitat. For example, in 2007, two different stations recorded annual average maximum temperatures of 79.4 and 60.8°, as well as 10.5 and 13.1 inches of precipitation, respectively. The park's longest-running climate station has

been active for 103 years. In 2007, this station recorded the fourth-highest average maximum daily temperature ever, and precipitation was four inches below average. Zion NP is one of five NCPN parks that have shown increases in average minimum and maximum annual temperatures, as well as a decrease in snowfall, over the past 43 years or more. Zion NP climate data for the years 1904–2007 are available in an interactive, graphical format on the NCPN web page. A climate report, produced by the NCPN in 2008, is also available on the network's web page.

Additional Efforts

The NCPN is continuing to expand ecological monitoring at Zion NP. Protocols for monitoring invasive plants, uplands, land condition,

and land cover/land use are underway and planned for future implementation.

For more information

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